however, the male half of the feathering disappeared and was replaced by female plumage all over.

33, Pali Hill, SÁLIM ALI.
Bandra, Bombay.

XV.—OCCURRENCE OF COMB DUCK (*SARKIDIORNIS MELANOTUS* PENN.) IN MYSORE.

With reference to Mr. R. F. Stoney's note xiii on p. 525 of vol. xliii, I have to record shooting a Comb duck (female) about 50 miles west of Bangalore on 14-1-43—the bird was solitary. This is the first of the species shot by me in S. India though I had definitely seen it once previously near Gundlupet, 40 miles south of Mysore City.

Bangalore, E. G. PHYTHIAN-ADAMS.
January 18, 1943. *Major.*
I.A., F.Z.S.

XVI.—RED CRESTED POCHARD (*NETTA RUFINA* PALLAS) IN MADRAS PRESIDENCY.

As reports of this duck in the Province appear to be scanty, it may be of interest to record that I shot a male from a flock of about 30 on a tank near Cumbum in the Kurnool District on 11-12-1942.

Bangalore, E. G. PHYTHIAN-ADAMS.
January 18, 1943. *Major.*
I.A., F.Z.S.

XVII.—NOTES ON THE VIVIPARITY OF THE COMMON INDIAN SKINK [*MABUYA CARINATA* (SCHNEIDER)].

A specimen of the common Indian skink, *Mabuya carinata* (Schneider) was collected from the suburbs of Calcutta on March 11, 1943, for the study of its protozoal contents and helminths by my colleagues Messrs. M. M. Chakravarti and G. K. Chakravarti. It was a gravid female and contained embryos in a fairly well-developed condition. It was handed over to me in a partially dissected condition for the collection and preservation of the embryos, and my thanks are due to my colleagues on this account. In view of the dubious viviparity of this species (Smith, '35, p. 268) it seems desirable to record the following observations.

The specimen was fairly large, measuring 124 mm. from snout to vent, the tail being 149 mm. The eggs with ripe embryos were arranged in fours, one after the other in a series, in each uterus. An ovary with immature ova in various stages of development was

found to be located on the left side of the vertebral column very near the left oviducal opening, there being no trace of any other ovary on the right side, which might have been lost while the alimentary tract was removed. The eggs *in situ* appeared to be broadly oval and were about the same size. Unfortunately they had not been measured before the embryos were taken out, but from an ocular examination they were estimated to be 15 by 10 mm. on an average. Although each embryo was in a fairly advanced stage and had pentadactyle limbs well-developed, the egg itself contained much yolk. The outer envelope covering the eggs was thin, colourless and transparent, and the vascular allantoic sac was clearly noticed through it. From this it might be assumed that a calcareous shell had not been so far deposited on the egg. The translucent uterine wall which was very much thinned out presumably owing to the lodging of the developing embryos enabled me to notice also the movement of the embryos as well as the allantoic circulation.

It should be noted that I did not much care to determine how the eggs were held in the uteri, especially the mode of their attachment to the wall of the uterus, as recorded in certain lizards giving some hints of placental connection (Kerr, '19, p. 483).

The embryos were carefully removed from the eggs and fixed in the aqueous Bouin's fluid. It was observed that the embryo within the egg lay snugly curved upon itself, while the long tail was coiled a few turns and hugged between the limbs. All the embryos appeared to be more or less in the same stage of development. On the following day, when they were measured, the length from snout to vent ranged from 22 to 23 mm., with 22.5 mm. as the average, and the length of the tail, between 23.6 to 25.8 mm., with 24.7 mm. as the average.

Although the embryos look like veritable miniature skinks, their morphological characters differ somewhat from those of the adult pattern. The head was proportionately large as is usual in all embryos. The brain was clearly visible through the almost transparent membranous skull. The head and chin shields, so characteristic of the adult, were not yet developed, while a uniform non-overlapping squamation covered the rest of the body, viz., throat, trunk with limbs and tail. The eyes were prominently developed, and the lower eye-lids without any scales. It is interesting to note that the parietal organ which is so characteristic of almost all lizards (Sedgwick, '05, p. 344), was seen very clearly under the binocular microscope, in the form of a dark-ringed fleck on the middle of the head of the embryos. This parietal fleck was, however, not evident in the adult female specimen from which the embryos were removed. The ear opening covered by the tympanum was not yet deeply sunk. The limbs were well-developed, as noted before, with fully-formed digits. The fingers, and especially the toes, however, had not attained the characteristic pattern and relative proportions of the adult. Pigmentation did not occur in any part of the embryo. No 'egg-tooth', such as occurs in very many lizard embryos at the extreme tip of the snout, was observed. From the data at hand it cannot be decided whether

M. carinata produces young alive or lays eggs containing ripe embryos only to be hatched soon after.

With regard to Gadow's ('01, p. 560) sweeping statement: 'all the Scincidae seem to be viviparous', Malcolm Smith ('35, p. 256) expresses an element of doubt, since he has recorded more oviparous forms than viviparous ones. He holds that viviparity is possibly true of the majority of the Australian skinks, but not of the Oriental forms. He states further that so far as is known of the Indian genera of Scincidae, all the species of *Tropidophorus* are viviparous, and of the rest only four species belonging to three genera, viz., *Mabuya aurata, M. m. multifasciata, Lygosoma i. indicum* and *Leiolopisma himalayanum* are recorded to be viviparous. Closely related species and even genera frequently adopt either method of breeding, and from this point of view the genus *Mabuya* becomes extremely interesting in that the 'closely allied species may produce young by either method, for example, *Mabuya carinata* and *M. multifasciata* or *M. dissimilis* and *M. aurata*' (Smith, '35, p. 6). Boulenger (1890, p. 190), however, under the species *Mabuia macularia*, notes, 'this species is stated by Theobald to be oviparous, whilst its close ally *M. carinata* is, like most Scincoids, viviparous.' Perhaps to this statement Malcolm Smith (*loc. cit.*, p. 268) has taken exception, and reiterates in reference to the species *M. carinata* particularly, 'it is usually stated that this Skink is viviparous, but such is not the case. A female kept by Father Dreckmann in captivity laid 23 eggs; from another female he removed 22 eggs. All are of about the same size, approximately 13 by 8 mm.; none of those examined shows any trace of embryo. Both clutches are now in the British Museum.' From the above statement it is quite apparent that Malcolm Smith lays considerable emphasis on the oviparity of *M. carinata*. But the observations recorded by me above on *M. carinata* differ from those of Father Dreckmann. It appears to me, however, that the eggs obtained by Father Dreckmann were in all probability either infertile or in a very early stage of development.

Now the point is whether *M. carinata* can be called viviparous or not. It may be pointed out that Malcolm Smith ('35, p. 263 and p. 269) notes that *M. aurata* contains eight almost fully developed embryos, while *M. m. multifasciata* produces five to seven young ones. Both the species, in his sense of the terminology used, are viviparous. From this emerges the view that a female specimen containing embryos in the uterus may as well be described as viviparous. It may also be noted in this connection that Gadow ('01, p. 499) in general consideration of the Saurian eggs states, 'many Lizards do not lay their eggs until they contain ripe embryos, which burst the shell shortly after deposition. Some, for instance *Lacerta vivipara, Anguis fragilis,* and *Chamaeleo pumilus*, are practically viviparous.' Further, Graham Kerr ('19, pp. 482-83) is of the opinion that there are three steps in the evolution of viviparity in reptiles. In the first type are included those forms (*Anguis, Vipera, Coronella*) in which the egg is merely retained within the uterus, the egg-envelope persists without having any intimate relations developed between the embryo and the maternal tissues.

Note should be made of the fact that an intra-uterine development of the ovum into an embryo generally takes place before the egg is deposited. As *M. carinata* seems to belong to this type, I do not refer to the other two types described by Graham Kerr. From all these considerations, *M. carinata* is, to all intents and purposes, a viviparous skink, and not an oviparous one as contended by Malcolm Smith. If *M. carinata* lays eggs at all, such as those with embryos as described above, it should rightly be described as ovo-viviparous, and strongly do I suspect that many of the skinks would turn out to be ovo-viviparous in which the hard calcareous shell has been dispensed with. As far back as 1890, Boulenger noted, 'they (Scincoids) are, as far as we know, ovo-viviparous, with the exception of *Mabuia macularia,* which, according to Theobald, is oviparous' (p. 180). Annandale ('10, p. 201) and Okada ('35, p. 56) incidentally lend support to the view that most skinks are ovoviviparous.

A further coincidence of fact that may be noted here is that *M. aurata* and *M. carinata* both contain eight well-formed embryos, while *M. m. multifasciata,* which is a close ally of *carinata,* produces five to seven young ones. But the number of eggs (23 and 22) laid by or removed from *M. carinata* as given by Father Dreckmann (Smith, '35, p. 268) seems surprisingly larger and is no less puzzling. This, therefore, requires further confirmation in the light of present observation as well as from the fact that none of the skinks, especially *Mabuya,* has so far been credited with laying eggs or producing young ones more than nine in number.

McCann ('40) who has recently given elaborate accounts of breeding habits of many Indian lizards, records some brief observations on the two common species, *M. carinata* and *M. macularia,* but he has not noted anything about the breeding habits of the former except that the young ones are numerous during the months of June and July. The presence of young would naturally indicate that hatching must have occurred recently. However, he has given a photograph of the genital organs of a female *M. carinata* which clearly demonstrates that both the ovaries contain immature ova, and that they are situated at different levels, the right one being located slightly anterior to the left. It cannot be made out from that photograph, nor from the text, whether the specimen is a recently parturiated female or not.

Blanford notes (*vide,* Smith, '35, p. 268) that the breeding season of *M. carinata* in the Godavari district is during March, and it is true of the specimen, though single, obtained from Calcutta in March.

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March 29, 1943.

References.

Annandale, N., 'Notes on the Darjiling Skink (*Lygosoma sikkimense*)', *Rec. Ind. Mus.*, V, p. 201, (1910).

Boulenger, G. A., Reptilia and Batrachia, *Fauna of Brit. India,* (1890).

Gadow, H., Amphibia and Reptiles, *Cambridge Nat. Hist.*, viii, (1901).

Kerr, G. J., Text-book of Embryology, vol. ii, Vertebrata with the exception of Mammalia, (1919).

McCann, C., 'A Reptile and Amphibian Miscellany', Pt. ii, *Journ. Bombay Nat. Hist. Soc.,* xlii, pp. 46-64, (1940).

Okada, Y., 'Reptile of Jehol', *Rep. 1st Sci. Expdt. Manchoukuo,* sec. V, pt. II, Art. 2, p. 56, (1935).

Sedgwick, A., A Student's Text-book of Zoology, vol. ii, (1905).

Smith, M. A., Reptilia and Amphibia, vol. ii—Sauria, *Fauna of Brit. India* (1935).

Since the above article was written and accepted for publication in this *Journal* on April 6, 1943, I have come across a short note on the same subject [An instance of 'viviparity' in *Mabuya carinata* (Schneid.)] written by Mr. R. V. Seshaiya and published in 1938 (*J.B.N.H.S.*, 40, p. 132, 1938). I regret very much to have missed referring to this article. As my observations are considerably different from his brief account, although the conclusion is somewhat alike, I do not like to alter the text of my article. A brief comment may, however, be made here. Mr. Seshaiya did not record, *inter alia,* the number of eggs that were actually present in the uteri and the time of breeding, nor did he add a description of the embryos except that they superficially resembled a 3-day-old chick embryo. It appears that the embryos obtained by him were certainly in much earlier stages of development than those recorded by me above.

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35, Ballygunge Circular Road,
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XVIII.—THE ANATOMY OF THE DUODENAL REGION OF SOME GENERA OF APODA (AMPHIBIA).

(*With two plates*)

A comparative study of the duodenal region of some apodan genera was made to note the opening of the hepatic and pancreatic ducts.

In *Anura,* it is common knowledge that the hepatic ducts arising from the liver lobes unite to form a common hepatic duct with which one of the cystic ducts coming from the gall bladder merges to form the ductus choledocus. The other cystic duct opens into the common hepatic duct entering the pancreas. Entering into the choledocal duct, there is a duct (as shown by Wiedersheim) from